

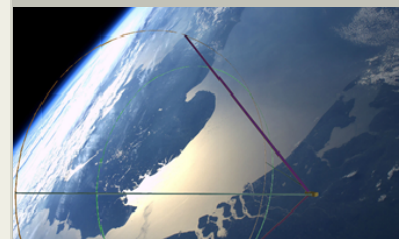
Multi-Purpose Interplanetary Deployable Aerocapture System (MIDAS), Phase I

Completed Technology Project (2014 - 2014)



Project Introduction

Altius Space Machines and MSNW LLC propose the development of a cubesat-scale Multipurpose Interplanetary Deployable Aerocapture System (MIDAS), to provide cubesats with the capability to perform reliable aerocapture and aerobraking missions. The MIDAS system consists of a thin, deployable, Magnetoshell Aerocapture (MAC) electromagnet coil that is deployed outward from the cubesat body using multiple elastically deployed composite STEM booms. The MIDAS system also incorporates into its structure a high-power cubesat-scale roll-out solar array (capable of >5W orbit averaged power even at Jupiter distances), and a high-power burst-mode Loop Yagi antenna for potential deep-space spacecraft-to-Earth ground link communications. While it will not be investigated in the proposed Phase I workplan, previous research at MSNW indicates that the MIDAS technology may also be able to provide shielding against solar flares and planetary radiation belts. The goal is to package this system into 2-3U of a 6U cubesat for missions to Mars, Venus, or Europa. The Phase I workplan will focus on sizing the MAC coil, creating an Active Aerogravity Tour (AATOUR) design tool for sizing MAC hardware for aerocapture missions, designing and sizing the MIDAS structure, analyzing the burst-mode Loop Yagi system to verify it can close a useful data link with Earth (and vice versa), and then designing and prototyping the MIDAS system for packaging and deployment. The Phase I efforts will culminate in the deployment testing of a full-scale MIDAS system. If completed successfully, the Phase I effort will raise the system from a TRL of 2 to 3. Follow-on Phase II efforts will develop and perform development tests on a full Brassboard MIDAS demonstration system, raising the system to a TRL of 4 or 5.

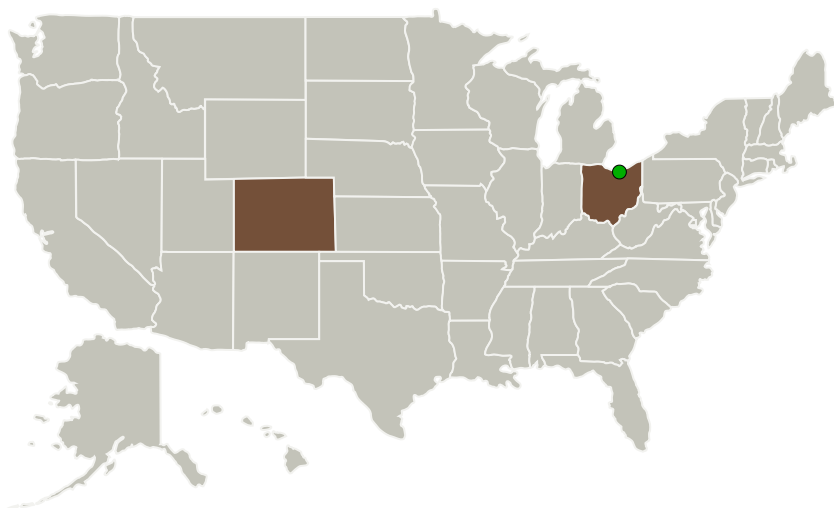


Multi-Purpose Interplanetary Deployable Aerocapture System (MIDAS) Project Image

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Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Altius Space Machines, Inc.	Lead Organization	Industry	Broomfield, Colorado
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

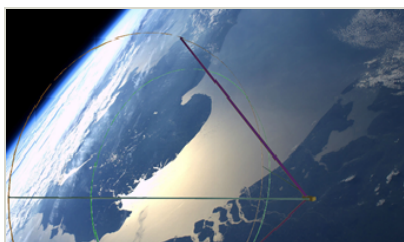
Project Transitions

**June 2014:** Project Start**December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137424>)

Images



Project Image

Multi-Purpose Interplanetary Deployable Aerocapture System (MIDAS) Project Image (<https://techport.nasa.gov/image/128006>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Altius Space Machines, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

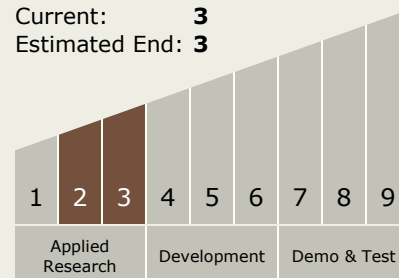
Carlos Torrez

Principal Investigator:

Daniel J Copel

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.1 Aeroassist and Atmospheric Entry
 - └ TX09.1.2 Hypersonic Decelerators

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System